

20 METRE GROUND PLANE ANTENNA

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Grounded vertical antennas with a tapped feed point, the so-called gamma-match, are well known. A gamma matched vertical antenna which is $\frac{3}{8}$ wavelength in height was found to have useful advantages for 20 metre band operation.

The advantages were:

1. It satisfied the primary objectives of occupying a minimum of space with maximum efficiency of radiation.
2. It was easy to construct from available materials at low cost.
3. It was more effective on 20 metres than an existing well known multi-band trapped vertical antenna.

The improvement in efficiency over the usual $\frac{1}{4}$ wavelength vertical or trapped multiband vertical antenna is obtained by a combination of factors each small but adding together significantly.

1. The angle of maximum radiation is reduced.
2. The antenna aperture is greater.
3. The base radiation resistance is increased resulting in reduced ground current losses.
4. Better impedance matching.
5. Increased bandwidth.

Referring to the drawings, the antenna was constructed of sections of $\frac{3}{8}$ in., $\frac{1}{2}$ in., $\frac{5}{8}$ in. and $\frac{3}{4}$ in. aluminium tubing adjacent sections of which closely fitted each other. A pair of 1 in. slots are cut in each end of the sections over which "Jubilee" hose clips are tightened when the adjacent ends are telescoped for about 6 to 9 inches.

U-bolts clamp the base of the antenna to a 2 ft. piece of 3 in. x 3 in. slotted angle steel (Dexion or similar). Two 4 in. pieces of $\frac{1}{2}$ in. aluminium "U" section clamp the top of the gamma section to the antenna for an outside spacing of 2 in. The stand-off insulators are cut from $\frac{3}{4}$ in. fibre glass rod and attached between the angle steel and gamma section by self-tapping screws inserted in holes drilled coaxially in the ends of the insulators.

The slotted angle steel can be bolted to a similar horizontal section as a base for mounting to any convenient chimney, post, etc. In this case, the base was

mounted on a car port metal roof using a left over piece of steel decking (Stramit, Monodek, etc.) to which the antenna base was bolted. The piece of steel decking was then clipped over the car port roof decking so that holes were not made in the roof.

The gamma match element should be 8 ft. long. The clamp is set at 7 ft. 6 in. from the base.

Soldering or other direct connections are not required between the base and ground plane steel decking because of the small antenna base impedance.

Four $\frac{1}{4}$ wavelength radials (16 ft. 8 in.) could be used for the ground plane if more convenient.

The series air-spaced variable tuning capacity should be covered against rain and dew by a small plastic container.

To tune the antenna, the transmitter is tuned to the centre of the 20 metre band on a dummy load of the same impedance as the coax line to the antenna. This can be done on low power with a few 1 watt non-inductive resistors in parallel to give the right value. The antenna is then connected in place of the dummy load. The series capacitor in the gamma section is tuned for minimum SWR, which should be 1:1 at approximately 80 pF. If a satisfactory SWR is not achieved, the length of the antenna should be adjusted and the capacitor retuned.

It was found convenient to connect the SWR bridge at the antenna end of the coax line and to make the adjustments while remotely keying the transmitter on CW at the minimum power required to operate the meter.

The antenna could be scaled down to 15m or 10m operation by taking respectively three-quarters or half the lengths shown for 20m for the antenna and gamma sections.

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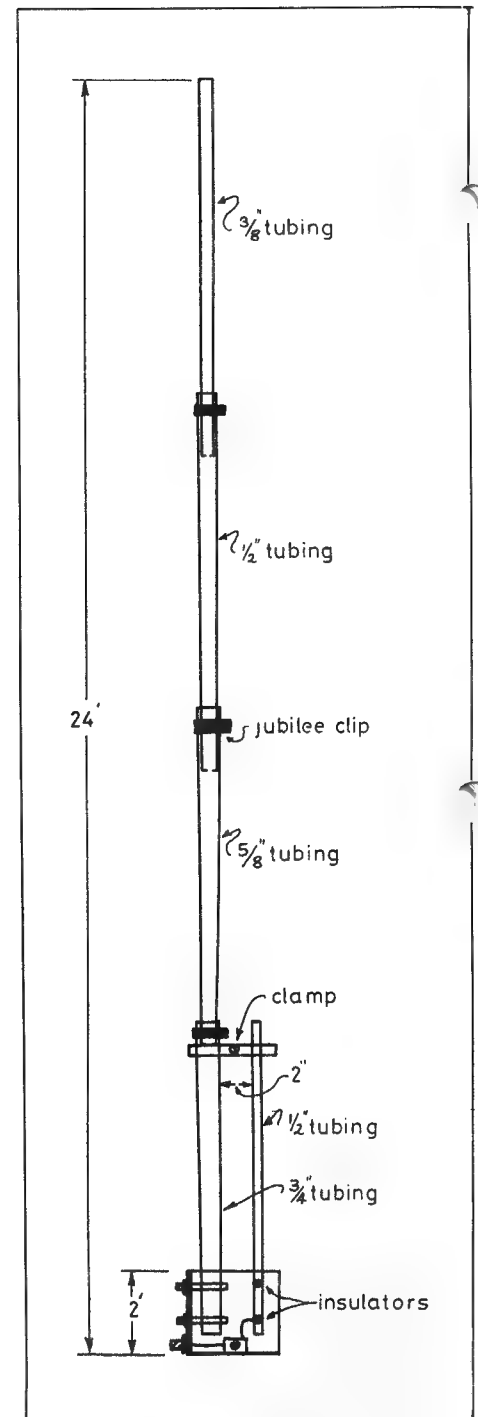


FIG. 1: $\frac{5}{8}$ th Wave Ground Plane Antenna